SOIL CONSERVATION SERVICE
KENTUCKY

LAND RECLAMATION, FIRES
(Abandoned Mine Land)

451

INTERIM STANDARD

- Definition -

Controlling or extinguishing fires in abandoned coal mine and coal refuse.

- Scope -

This standard applies to fires in coal formations and refuse from surface or underground coal mining activities, generally associated with abandoned mine lands.

- Purpose -

Controlling or extinguishing coal mine or refuse fires to eliminate harmful fumes and gases, improve public safety, conserve coal resources, prevent ignition of additional coal or refuse, protect surface lands and vegetation, remove the threat of forest fires, improve water quality, and restore areas to a beneficial use.

- Conditions Where Practice Applies -

Locations where coal or refuse is burning and degrading the environment. Land reconstruction will normally be associated with this practice.

- Planning Considerations -

1. Area of burning material.
2. Geologic sections of the strata where coal is burning.
3. Land use, dwellings, and other improvements in the area.
4. Hazardous fumes and gases being released.
5. Ignition potential for other combustible materials.
6. Materials available for extinguishing the fire and stabilizing the area.

Design Criteria

There are four primary methods for controlling mine fires, depending on the conditions. They are (1) loading out, (2) fire barriers--trench and plug, (3) flushing (grouting), and (4) surface sealing.

Loading out involves digging out the burning and heated material, and cooling it with water or by spreading it on the ground. The cooled material is then disposed of in a safe manner either on the site or at a disposal area. The area is then protected from ignition, usually by surface sealing with soil material. (See surface sealing below.)

The excavation should start between the fire and the unburned coal seam or unburned refuse material. The burning materials must be cooled by water to allay dust to reduce the chance of explosions and to prevent damage to machinery.

Fire barriers. A trench barrier is made by excavating a trench, usually from outcrop on one side of the fire to outcrop on the other side, between the burning material and the unburned material. The trench is backfilled with incombustible materials such as earth, fly ash or granulated slag. The sides of the trench excavation must be stable. The minimum thickness of the incombustible backfill barrier must not be less than 12 feet.

A plug barrier is used where excessive overburden prevents use of a trench barrier. The plug barrier is installed similar to a trench barrier except the trenches are started at an outcrop and are terminated when the overburden exceeds 60 feet. Two plugs will normally be required, one on each side of the fire. The surface over the fire and between the two plugs must be sealed to where the overburden exceeds 60 feet. (See surface sealing below.)

Flushing. This method is designed to fill the voids around an underground fire area with finely divided incombustible solids to prevent airflow to the burning materials. This method is applicable where excessive overburden or improvements preclude the use of other methods.

Six-inch boreholes into the mine void on 10-foot centers are used to construct the barrier. Holes on adjacent lines are to be staggered. Sand, water-cooled slag, crushed limestone, and crushed and screened earth or shale can be slurried into the mine through the holes. Another alternative is to use air flushing injection of dry fly ash material. Barriers constructed by this method may consist of one row of 6-inch boreholes on 25-foot centers. In each case the installation must be monitored to insure enough fine noncombustible material is installed to make the barrier effective. Angle drilling around improvements and other obstruction may be necessary.

Surface sealing. Surface sealing is used on fires that have extended for a great distance along an outcrop or in conjunction with other control measures. Sealing is obtained by covering the desired area with not less than 4 feet of noncombustible fine-grained earth material, by plowing surface material, or depositing suitable material. The seal should extend vertically from 10 feet below the burning material to 60 feet above. All openings and drains must be sealed to cut off the flow of oxygen. Drainage pipes with traps to prevent air and gas passage may be used if continuous water drainage is necessary.

If an exposed coal seam is involved, the seal or barrier must be at least 12 feet thick.

Erosion must be controlled to prevent breaking the seal. Diversions, vegetation and water disposal systems should be used to insure an effective seal.

Maintenance

Extinguished mine fire areas are to be monitored to insure that the fire is out. Fires extinguished by loading out may be monitored by surface inspection. Other fire areas shall have monitoring holes installed into the burning zone.

The monitoring holes shall not exceed 200 feet spacing in any direction. The monitoring holes shall be sealed and the temperature monitored. A weighted thermocouple is lowered into the hole and the temperature read on the surface with a potentiometer. Temperatures should be read at least every 60 days. Monitoring may be stopped when the maximum temperature in all wells reaches 120° F. or less and the trend is down.

A maintenance plan will be developed including temperature monitoring required. Regular periodic inspections must be carried out until the fire is extinguished and the area stabilized. Needed maintenance must be carried out promptly to insure a successful operation.

Protection

All disturbed areas shall be reshaped and regraded to blend with surrounding features. Visual resources must be considered in the installation. Exposed toxic material and rock shall be covered with solid materials and established to vegetation or protected by other means. Access roads must be maintained and foot and vehicular traffic controlled to protect the work.

Plans and specifications

Plans and specifications for controlling mine and refuse fires shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.